# Response of Rice to Changing Climatic Condition: (I) Genotypic Variation in Growth Response to Elevated Temperature

Estela M. Pasuquin (1), (2), Russell Reinke (3), Tanguy Lafarge (1), Phil Eberbach (2), Toshihiro Hasegawa (4) and Len Wade (2)

(1) Crop and Environmental Sciences Division, International Rice Research Institute, Philippines, (2) Charles Sturt University, Australia, (3) Yanco Agricultural Institute, NSW Department of Industry and Investment, Australia, (4) National Institute for Agro-Environmental Sciences, Japan

( e.pasuquin@cgiar.org, epasuquin@csu.edu.au )

The predicted increases in global atmospheric temperatures are likely threats to rice productivity. In order to help develop better genotypes and crop management strategies to sustain the continuously increasing demand for rice, deeper understanding of the growth and physiological responses under increased temperature and other related climatic conditions is needed. This study aims to evaluate the response of 18 rice genotypes from Japonica, Tropical Japonica, Indica, Aus/Japonica and Glaberima/Japonica germplasm group with a wide range of high temperature response. Seeds were direct-sown and grown in pots under continuous day/night temperatures of 25°C, 28°C, 31°C and 34°C under naturally-lit chambers in Yanco (11.5 MJ $m^{-2}$ $d^{-1}$) and in artificially-lit chambers in Wagga Wagga (7.8 MJ $m2^{-1}d^{-1}$), New South Wales, Australia.. Growth was poor (6.9 g/pl) at Wagga Wagga under artificial light at all temperatures, so those results were not considered further. In contrast, individual plant dry weight at 72 DAS at Yanco decreased from 27.1 g/pl at 25°C to 14.66 g/pl at 34°C under natural light (11.5 MJ $m2^{-1}d^{-1}$). Vandana had high, Takanari had intermediate and Akihikari had low dry weight at all temperatures. Contrary to expectation, N22 had reduced dry weight at high temperature while IR72 and especially IR64 retained or even increased dry weight at high temperature. The response of the individual genotypes to climatic conditions inside the growth rooms was quite wide, but discrimination between the climatic factors and their effect on plant growth could not be achieved in the facilities exploited here. A more intensive characterization of the responses in well controlled environments is needed to better identify and discriminate the mechanisms for adaptation to elevated temperature.